HF topical group plans for tracker review

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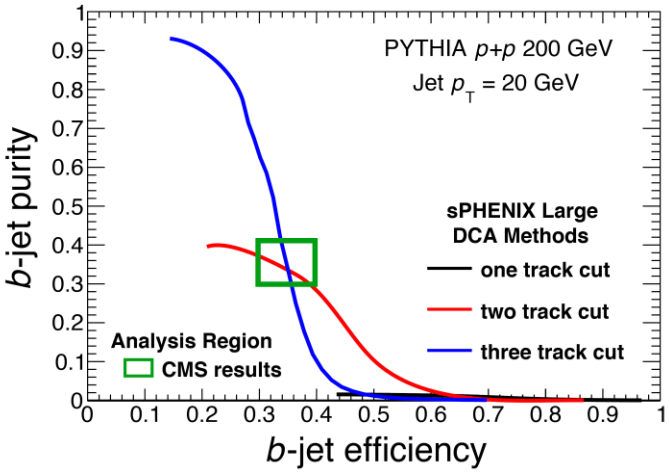
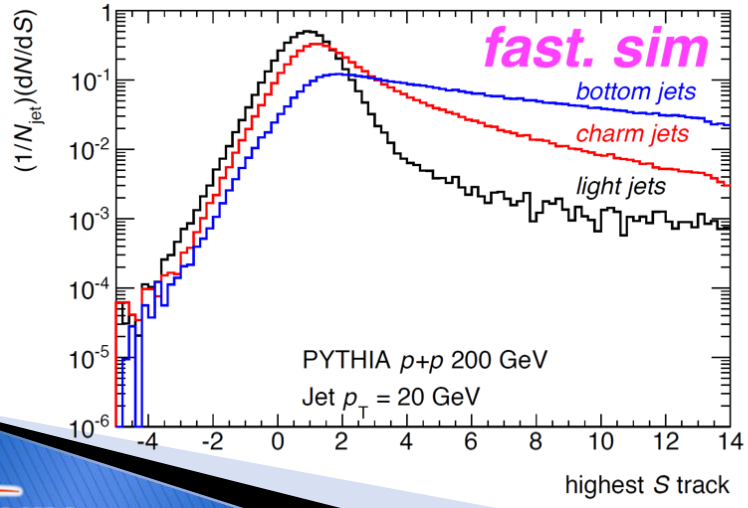
Overview

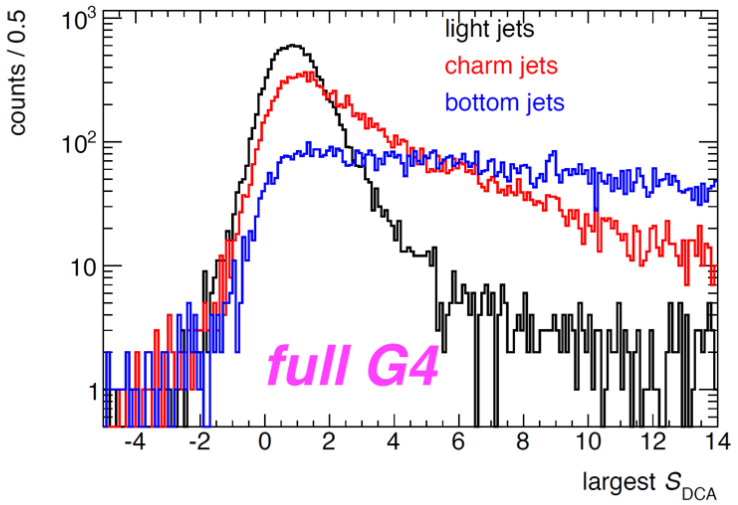


- B-jet tagging performance plot
  - High DCA track counting:
    - Verifying G4-based counting algorithm
  - Secondary vertex:
    - Developing RAVE based secondary vertex finder. Hopefully to be established as a second B-tagger for the review
  - Reevaluate tagging in HIJING embedded events:
    - Require re-tune of cuts, half day for 10k samples in private productions
- Relation to tracking development
  - Good tracking quality and purity:
    - Implementation of cluster quality control and space charge distortion
  - Implement ladder geometry for MAPS tracker instead of cylinder:
    - Modeling shape of DCA with uneven material distribution
  - Outer tracker resolution (dp/p and angular):
    - Secondary vertex mass and vertex p_T.
    - Comparing to Upsilon program, could have less requirement on dp/p but stronger requirement on angular resolution

B-jet tagging – High DCA track counting

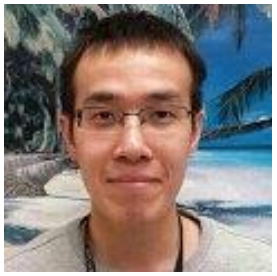
- Recent progress
  - Dennis implemented tagging in full Geant4 simulation, under testing
- Plan next:
  - Verification of G4 tagger performance in pp
  - Helper during Dennis' relocation



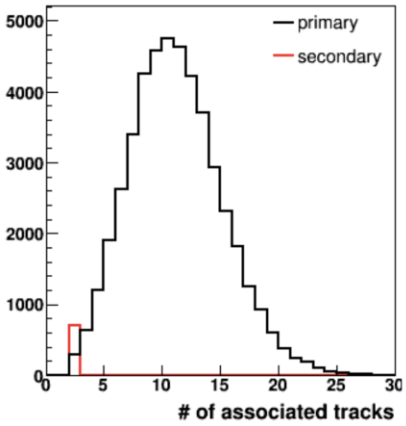


B-jet tagging – Secondary vertex

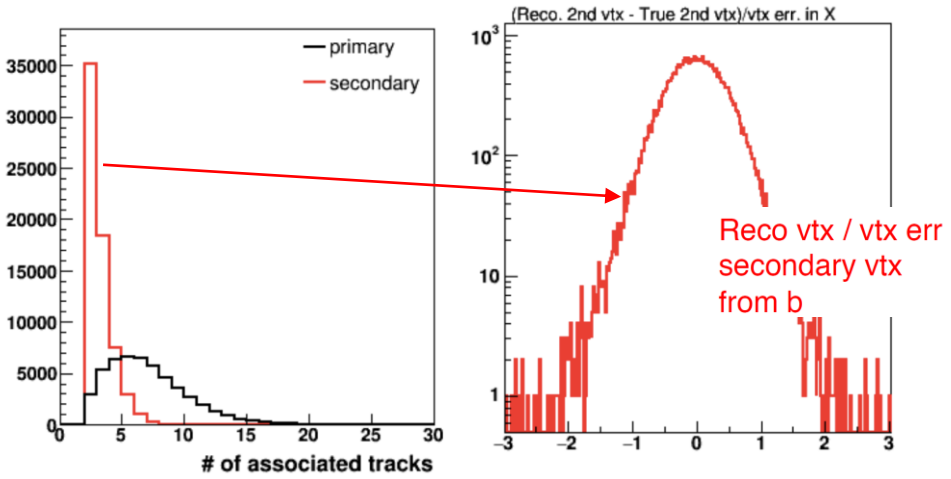
- Recent progress
  - Haiwang developed new Kalman filter (GenFit2) with vertex finder integration (RAVE)
  - Sanghoon tested secondary vertex finding in B-production event. Result promissing
- Plan next:
  - Secondary vertex finder in jet: 1-2 week?
  - Implement cut on secondary vertex significance and mass fit



Events with light quark-jets
(Pythia8 pTHatMin = 25 GeV)
Very few secondary vertex found



Events with b-jets
(Pythia8 HardQCD:bbbar)
84% event has secondary vertex, good quality



From Sanghoon's talk https://indico.bnl.gov/conferenceDisplay.py?confId=1919

From previous meetings

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High priority longer-term tasks

- Goal: realistic study of HF jet performance in sPHENIX simulation and reconstruction.
- Target time scale: tracking review
- High priority development tasks (help wanted):
  - Realistic implementation in Geant4
    - Tony F./Gaku M./Chris P., lots of progress
  - Generalized Kalman filter
    - Haiwang Y./Chris P., close to completion
  - Multi-vertexing/B-tagging via secondary vertexing in jet
    - Sanghoon L./Haiwang Y.: exploring RAVE option
  - B-jet tagging: Track Counting
    - Dennis P.: lots of progress in past weeks
  - B-jet tagging: Soft Lepton Tagging
    - Jin H. (+ Help)
  - B-jet tagging: B-Meson Tagging
    - Volunteer needed!